

# Superheroes of the Small Stuff:

An Evidence-Based Approach to Confidently  
Diagnosing and Treating Common Pediatric Illnesses



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# Pediatric Readiness Program Education Session

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Legacy Health and Oregon Emergency Medical Services for Children.

Legacy Health designates this live activity for a maximum of 1.0 *AMA PRA Category 1 Credit(s)*<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



# Objectives

- Locate and utilize evidence-based guidelines and algorithms for common pediatric infectious diagnoses.
- Discuss ways to incorporate the principles of judicious antibiotic use in children into clinical practice.
- Identify several strategies available to obtain quality lung, ear, and oral exams in children.

# CME Disclosure

None of the planners and faculty for this educational activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients.

# The Super Stuff We'll Learn

## **How to:**

1. Obtain the vitals, exam, and trust you need
2. Use evidence-based guidelines to diagnose & treat common pediatric illnesses
3. Judiciously prescribe antibiotics
4. Hydrate, medicate, and educate



A super shout-out!

*Danielle Sullivan, RN*

*Department of Pediatrics*



# Developing a Therapeutic Family Relationship

- Engage and involve the parents as much as possible
- Address immediate concerns
- Validation=trust
- Engage the patient directly
- Create a team environment



# Tips for obtaining accurate vital signs

1. One thing at a time
2. Least invasive first
3. Try toes and legs
4. Position for comfort and calm
5. Dispel fear of the unknown







# Pharyngitis

## Clinical Presentation

Chief Complaint: 6 yo male with 2 days of “terrible” sore throat.

ROS:

- 3 days rhinorrhea/congestion
- 2 days cough
- 2 days fever to 38.8C max
- Less interested in solids today; taking lots of fluids

Meds: None tried

Sick contacts: “Someone at school had strep throat last week”

***Should we swab his throat for strep?***

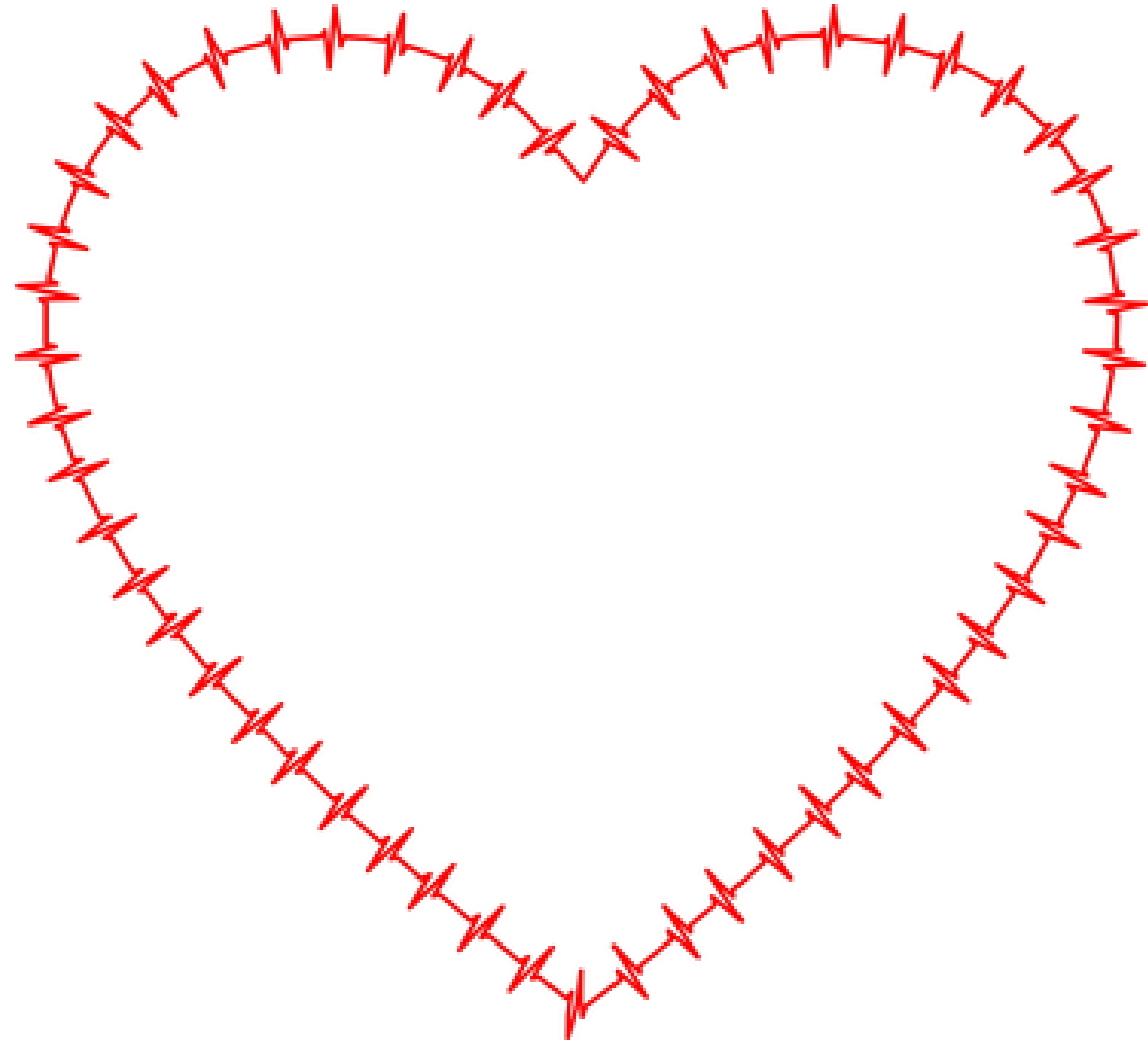


**Put those swabs away....**

# Pharyngitis

## Why Treat GAS?

- Lessens Illness Duration
- Prevent Transmission
- Avoid Non-Suppurative Complications:
  - Acute Rheumatic Fever +/- Carditis
  - Acute Glomerulonephritis
  - Strep Toxic Shock Syndrome
- Avoid Suppurative Complications:
  - Pharyngeal cellulitis or abscess
  - Sinusitis
  - Acute Otitis Media
  - Skin and Soft Tissue Infections
  - Intracranial Infections



**Table 4. Epidemiologic and Clinical Features Suggestive of Group A Streptococcal and Viral Pharyngitis**

**Feature, by Suspected Etiologic Agent**

**GROUP A STREPTOCOCCAL**

- Sudden onset of sore throat
- Age 5–15 years
- Fever
- Headache
- Nausea, vomiting, abdominal pain
- Tonsillopharyngeal inflammation
- Patchy tonsillopharyngeal exudates
- Palatal petechiae
- Anterior cervical adenitis (tender nodes)
- Winter and early spring presentation
- History of exposure to strep pharyngitis
- Scarletiform rash



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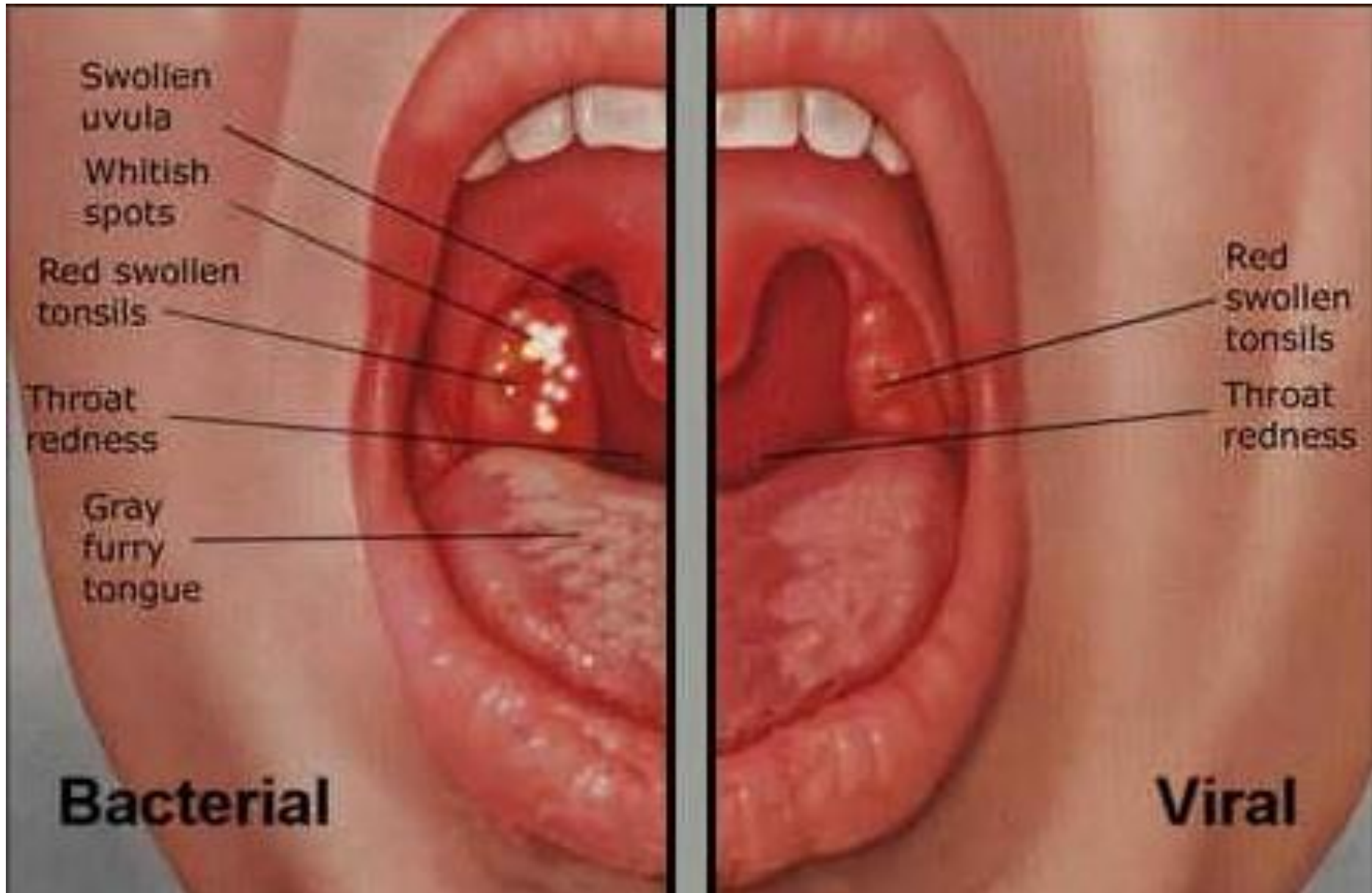
**Table 4. Epidemiologic and Clinical Features Suggestive of Group A Streptococcal and Viral Pharyngitis**

**Feature, by Suspected Etiologic Agent**

VIRAL

- Conjunctivitis
- Coryza
- Cough
- Diarrhea
- Hoarseness
- Discrete ulcerative stomatitis
- Viral exanthema



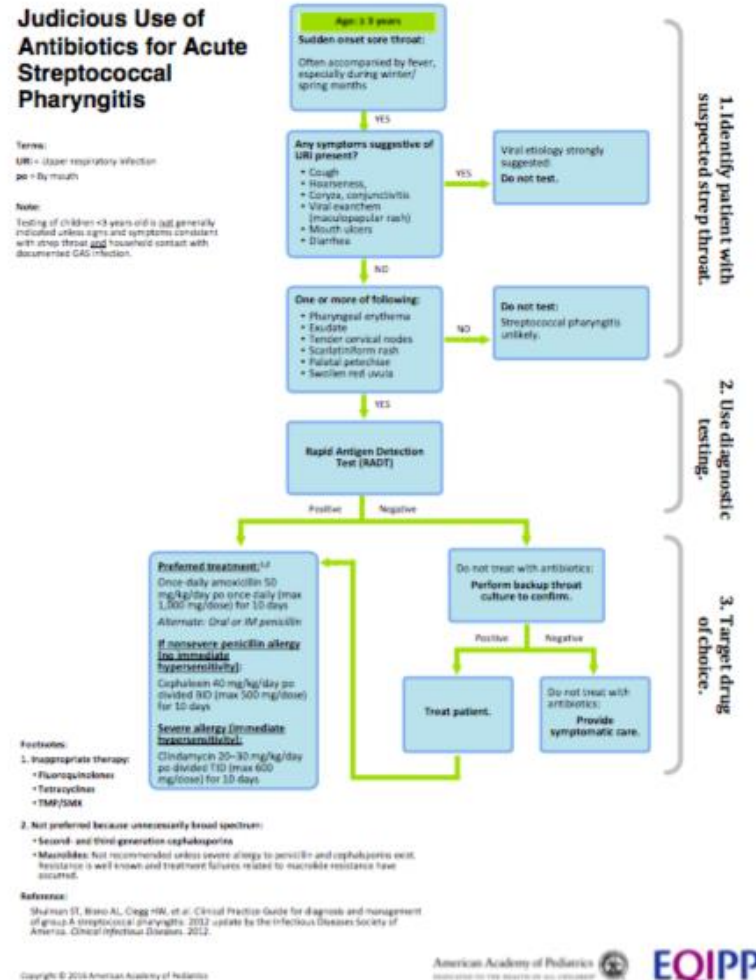


# Pharyngitis

## The AAP Guidelines

### Key Clinical Questions:

- ✓ Who should we test for strep?
- ✓ What tests do we use?
- ✓ Who should we treat with antibiotics?





# Judicious Use of Antibiotics for Acute Streptococcal Pharyngitis

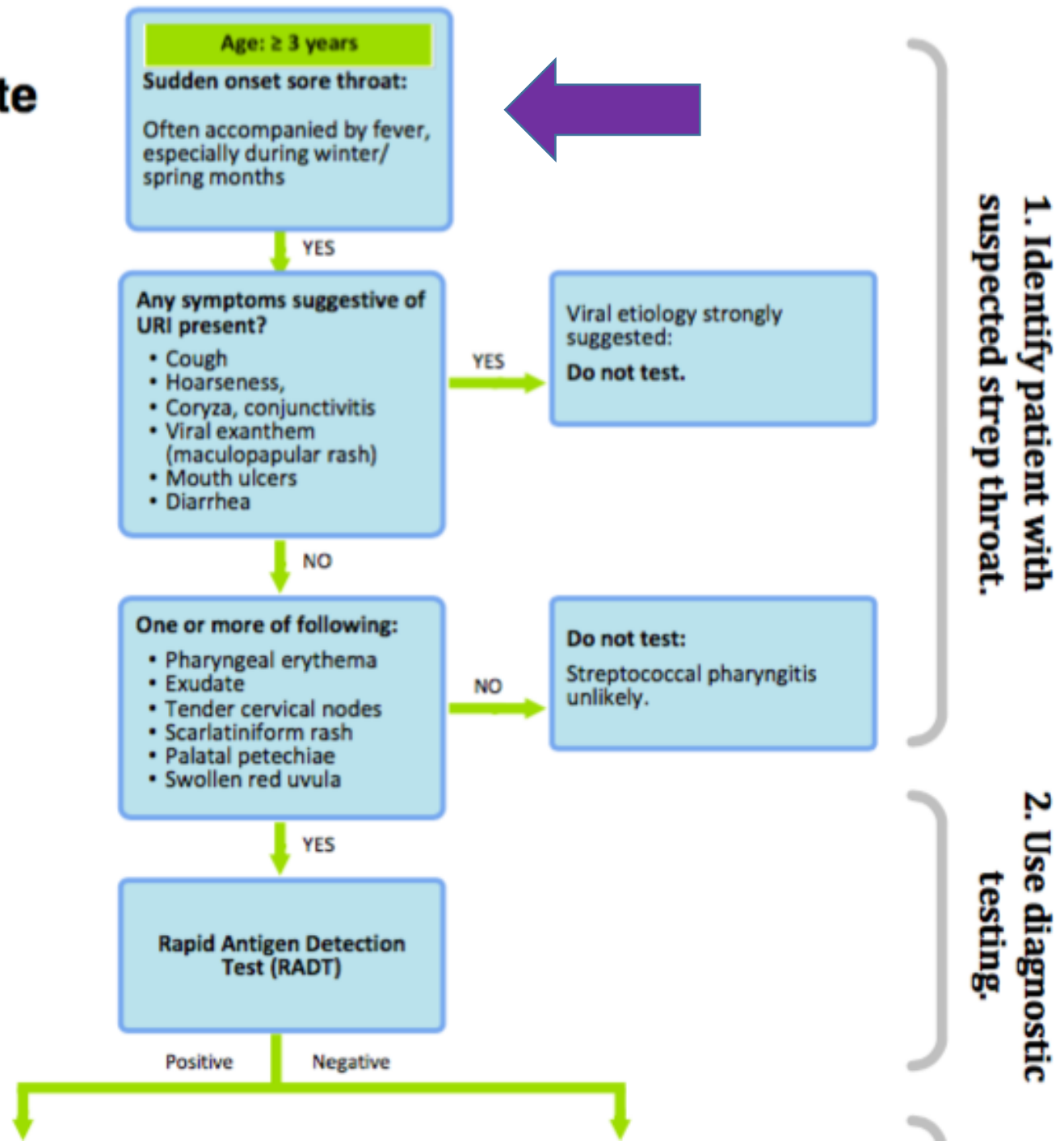
Terms:

URI = Upper respiratory infection

po = By mouth

Note:

Testing of children <3 years old is not generally indicated unless signs and symptoms consistent with strep throat and household contact with documented GAS infection.



# Judicious Use of Antibiotics for Acute Streptococcal Pharyngitis

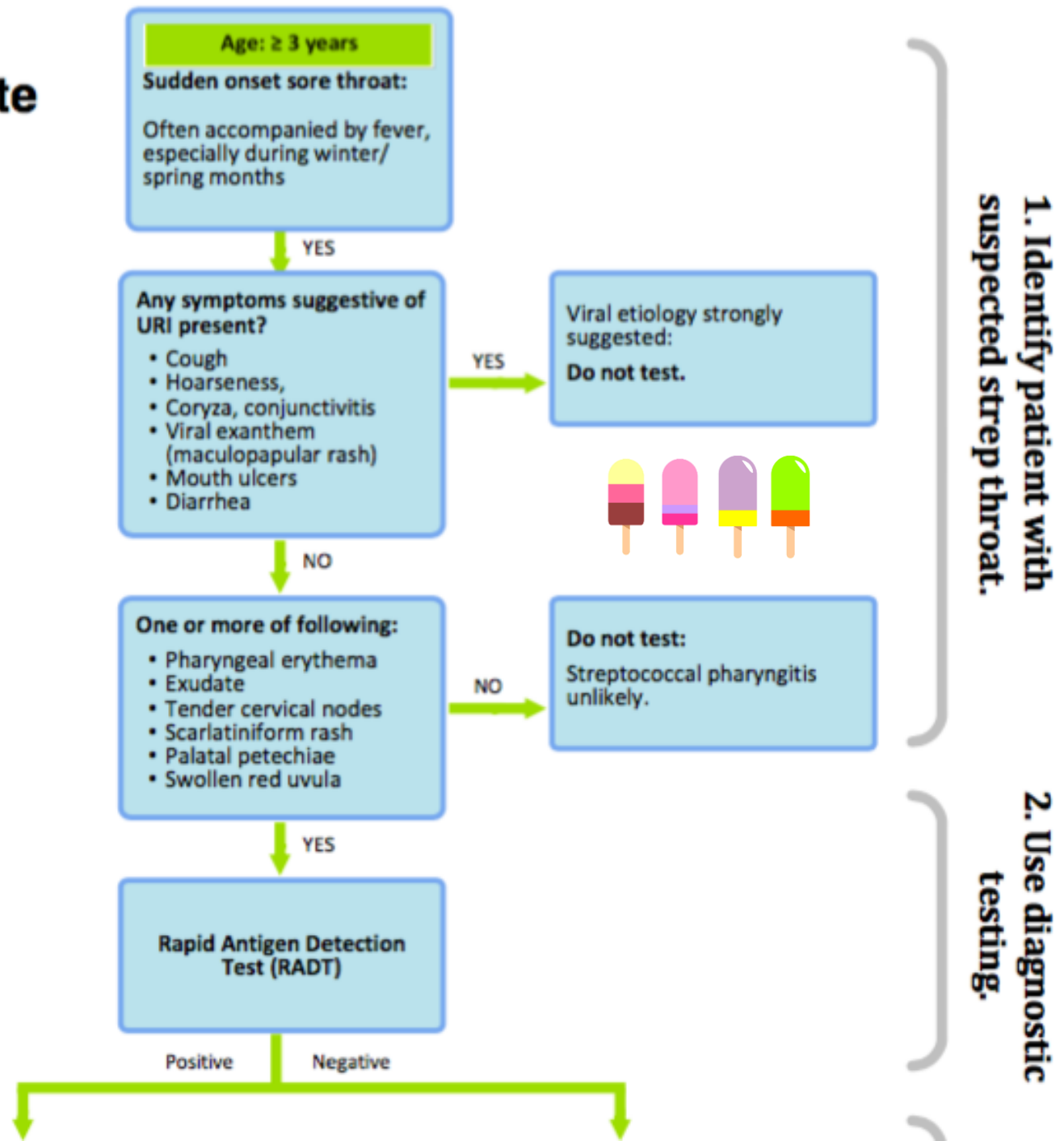
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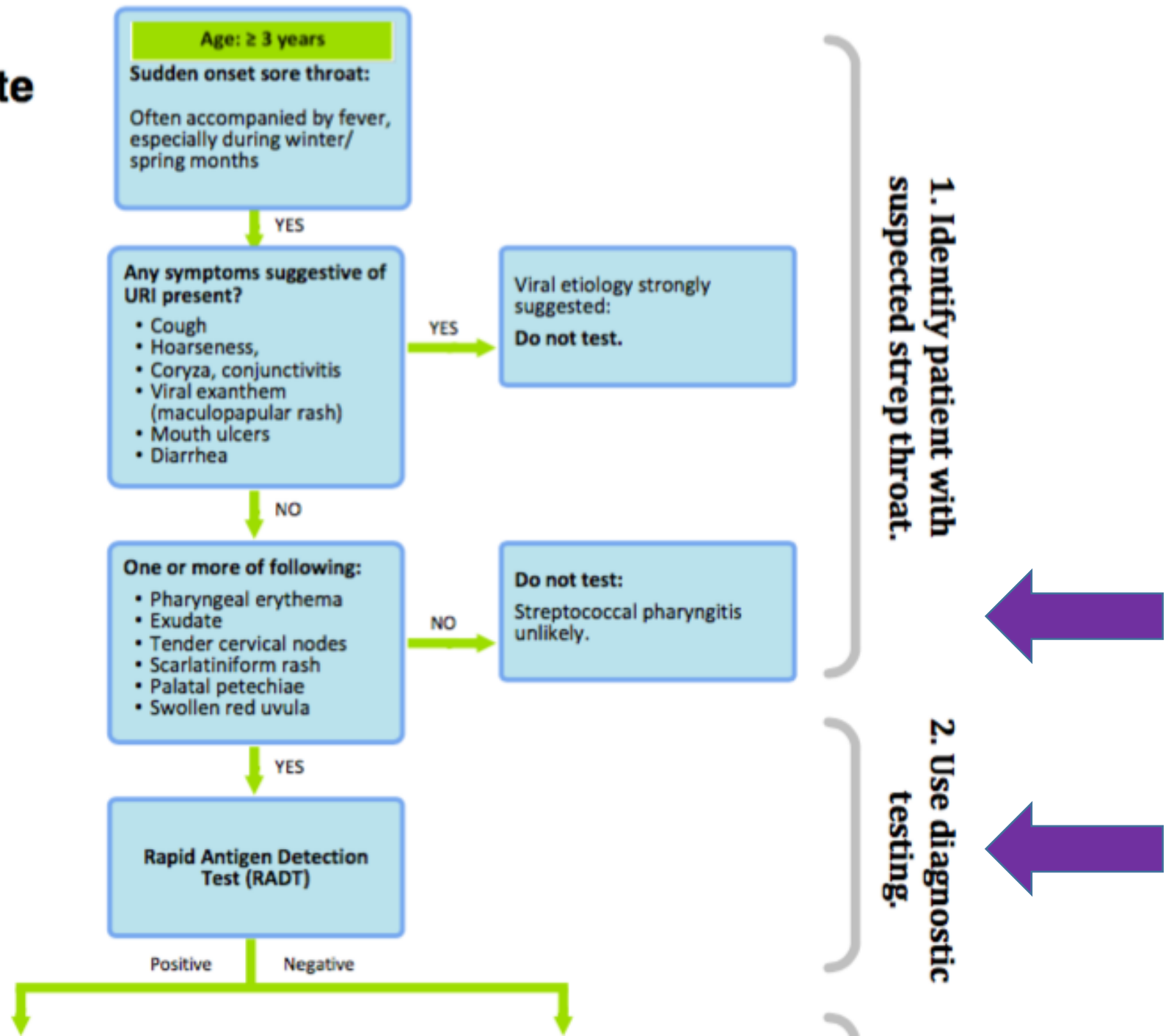
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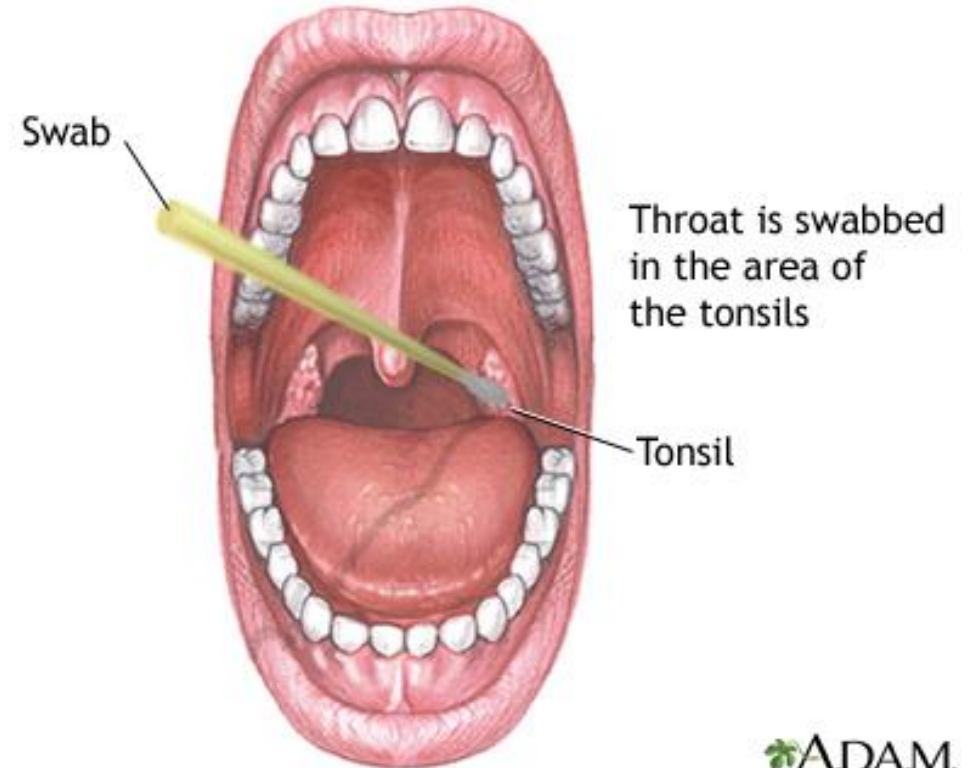
# Pharyngitis

## It's All About the Swab

- Strep Swabs

How to properly swab:

- Use a tongue depressor and a sterile cotton swab
- If you are doing a rapid strep and may need a culture as well, then use two swabs together at the same time



## How to properly swab:

- Try to get both sides, touching the infected area with the swab(s) several times
- Avoid touching tongue, cheeks, lips, or uvula with the swab
- This should not be a painful procedure but expect your patient to gag as you touch the back of her throat.



## Tips for swabbing kids:

- Explain what you're about to do ahead of time and show them the tongue depressor, or "popsicle stick", and the cotton swab
- If developmentally able to follow instructions, have them stick their tongue out and say "aaaaahhh"
- Use your tongue depressor to help open their mouth if necessary

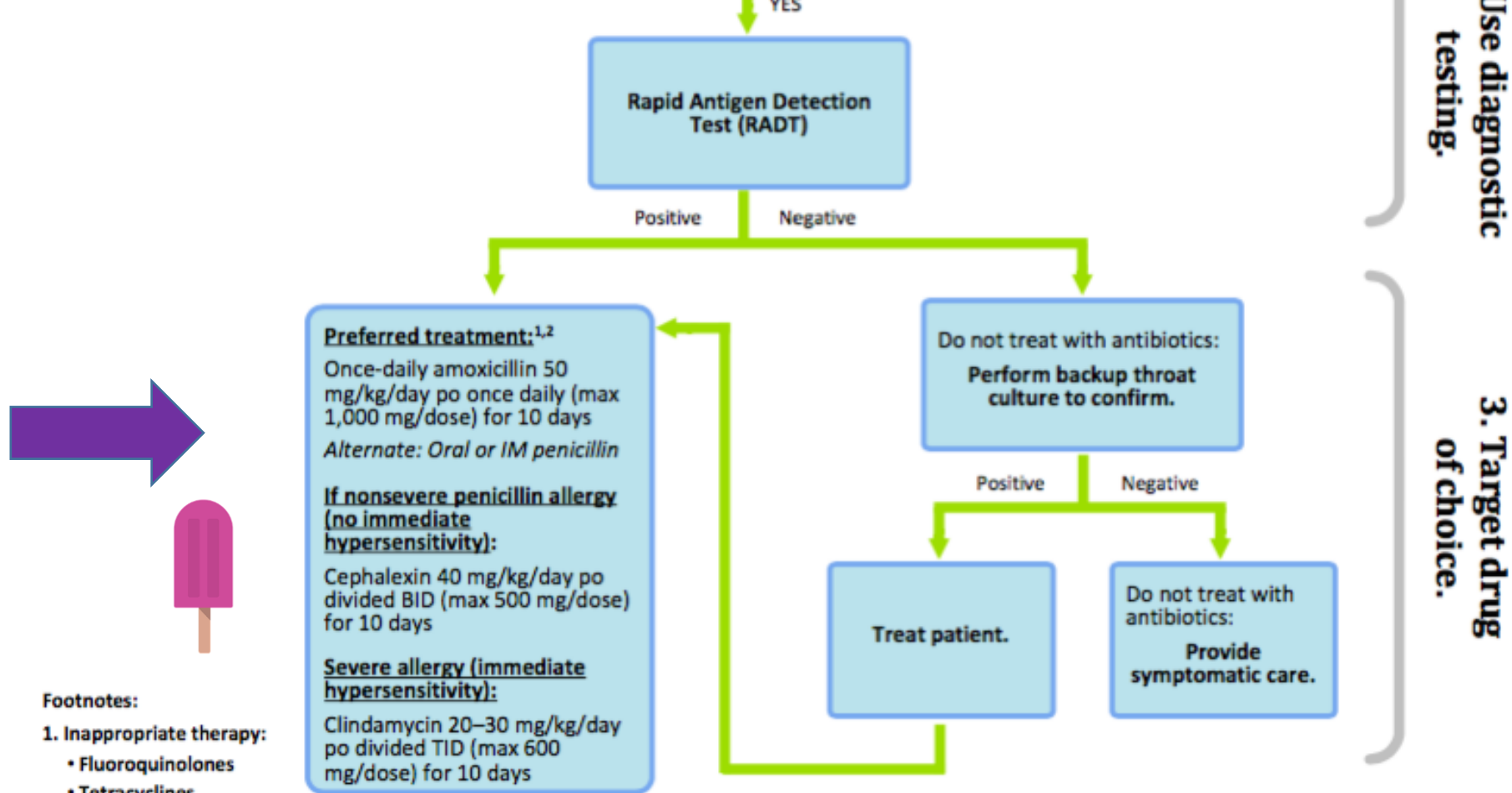




# Tips for swabbing kids

*Hands up!*





**Footnotes:**

**1. Inappropriate therapy:**

- Fluoroquinolones
- Tetracyclines
- TMP/SMX

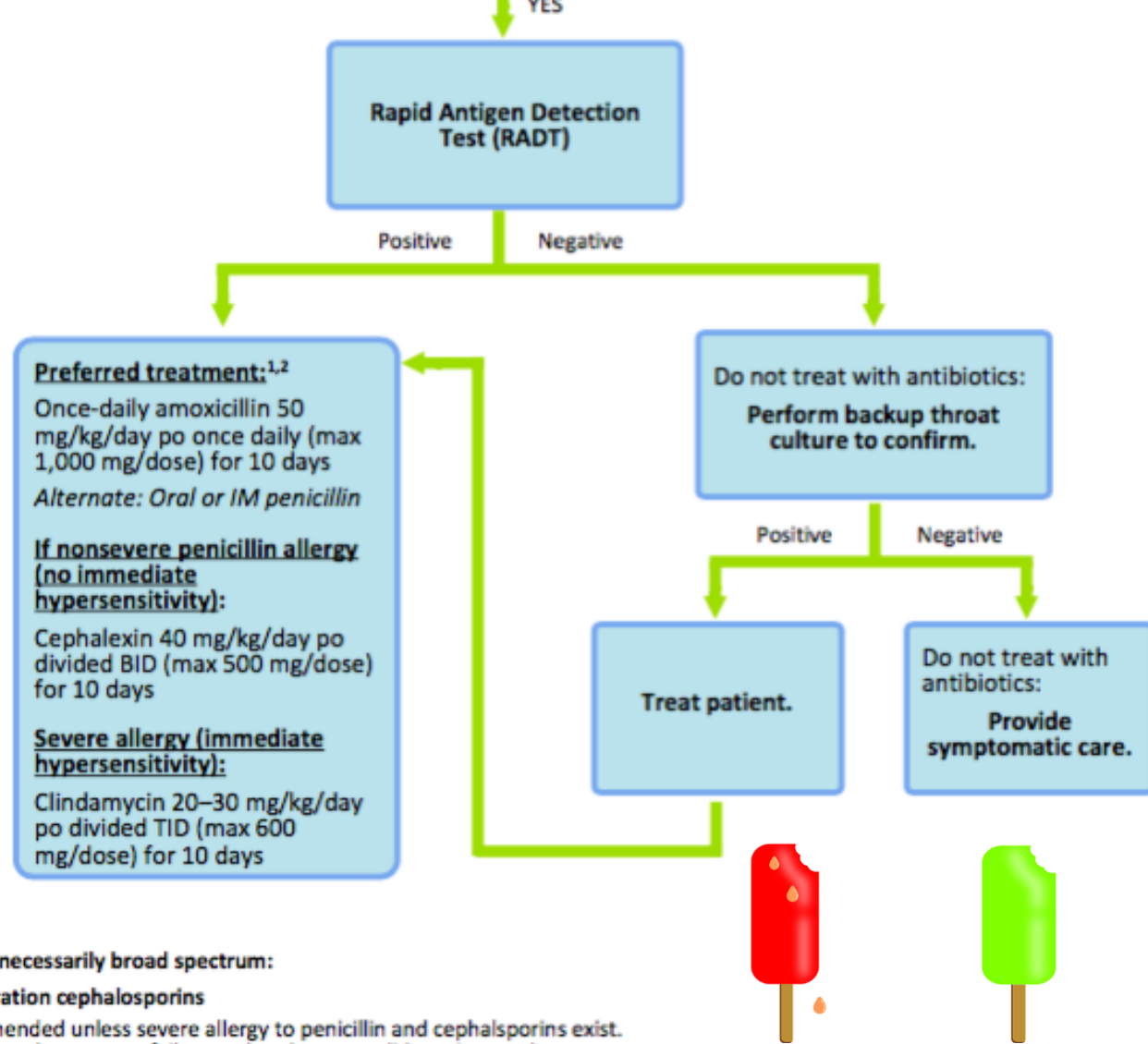
**2. Not preferred because unnecessarily broad spectrum:**

- Second- and third-generation cephalosporins
- Macrolides: Not recommended unless severe allergy to penicillin and cephalosporins exist. Resistance is well known and treatment failures related to macrolide resistance have occurred.

**Reference:**

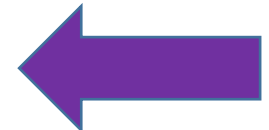
Shulman ST, Bisno AL, Clegg HW, et al. Clinical Practice Guide for diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*. 2012.





Use diagnostic testing.

3. Target drug of choice.



**Footnotes:**

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# Pharyngitis

## When To Think Harder

If You Note...	=	Make Sure to Consider...
Asymmetrical pillars, deviated uvula, muffled voice	=	Peritonsillar Abscess
Posterior oropharynx ulcerative lesions, +/- papular rash on hands/feet/buttocks	=	Coxsackie Infection (Hand, Foot, and Mouth Disease)
Anterior oropharynx involvement (ulcers, friable gingiva, bleeding)	=	Herpes Simplex Infection
Neck pain, high fever, decreased ROM	=	Retropharyngeal or Parapharyngeal Abscess
Exudates, posterior chain lymphadenopathy, fatigue, adolescent	=	Infectious Mononucleosis (EBV)
Gray membranous friable exudate, “bull neck” adenopathy, stridor, toxic appearance	=	Diphtheria
Well appearing, asymptomatic, afebrile child with positive strep test	=	Strep Carrier (?why are you swabbing this kid in the ED?) ☺

# Pharyngitis

## Bottom Line

- Not all sore throats are strep!
- Rapid strep testing has high specificity and throat cultures have high sensitivity...
  - \*\*\*but ONLY IF YOU GET A GOOD SAMPLE!
- Confirmatory cultures should be sent on those with negative rapids and concerning exam
- Antibiotics should be primarily only for:
  - + Rapid test –OR–
  - + Throat culture
- And: Have lots of popsicles in your care area.





# Otalgia

## Clinical Presentation

Chief Complaint: 15 month old F with fever and right ear tugging

ROS:

- 2 days of upper respiratory symptoms
- 1 day of fever to 39C
- Good PO intake

Meds: Acetaminophen x 1x

PMHx: Otherwise healthy child

Exam: Left TM normal appearance. Right TM erythematous, bulging, with opaque fluid

***Should we prescribe her antibiotics?***

# Otalgia

## The Basics

- Acute otitis media is the most common condition for which antibiotics are prescribed in the US
- Also a significant source of *over*-prescribing and posited antibiotic resistance
- How can we:
  - Diagnosis it more accurately?
  - Use less antibiotics?



# Otalgia

## The Exam



© Can Stock Photo



- The key to a good ear exam is a patient that will hold still!
- Have the parent hold the patient
- Face the patient towards parent
- Parent can help hold patient's head against parent's shoulder
- Don't forget distraction!

# Otalgia

## The Exam

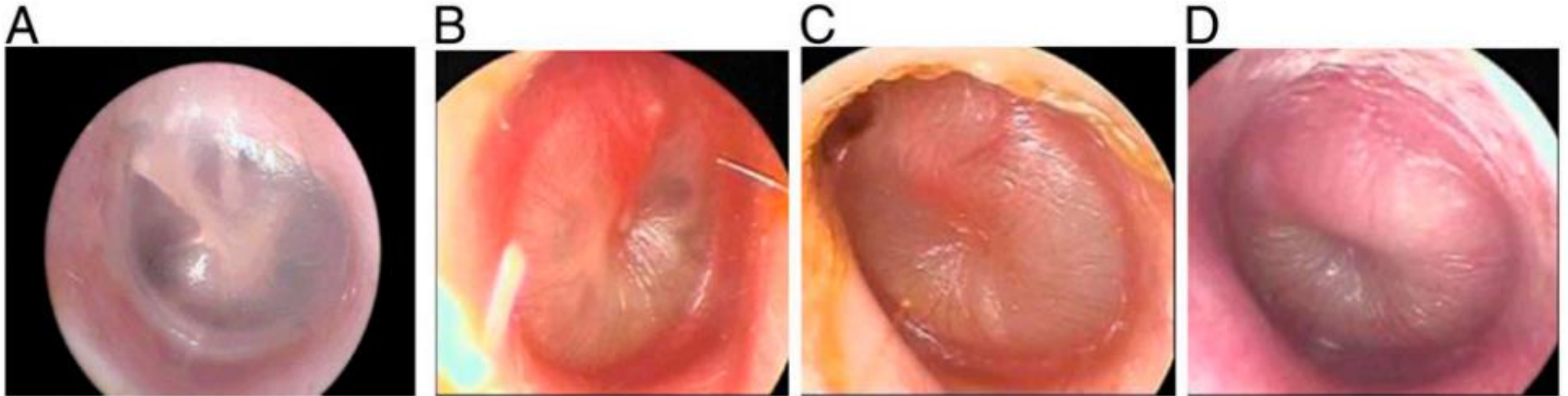


- Ear wax in the way?
  - Try a smaller otoscope head
  - Use a looped curette to pull it out or push it aside
  - Don't be afraid to look multiple times
  - If you need to know: irrigate the ear after using debrox or colace drops.



# Otalgia

## The Exam



**FIGURE 2**  
A, Normal TM. B, TM with mild bulging. C, TM with moderate bulging. D, TM with severe bulging. Courtesy of Alejandro Hoberman, MD.

LEFT BULLOUS MYRINGITIS



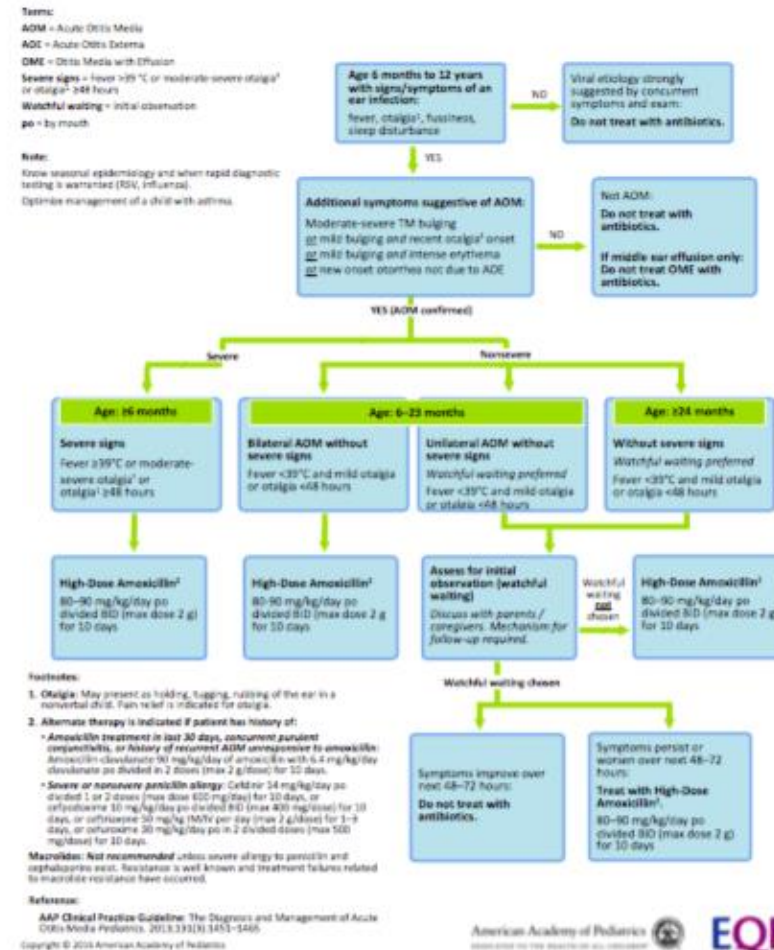
# Otalgia

## The AAP Guidelines

### Key Clinical Questions:

- ✓ Who actually has acute otitis media?
- ✓ Who should we treat with antibiotics immediately?
- ✓ When can we employ a “watch-and-wait” approach to antibiotics?

### Judicious Use of Antibiotics for Acute Otitis Media (AOM)



# Judicious Use of Antibiotics for Acute Otitis Media (AOM)

**Terms:**

**AOM** = Acute Otitis Media

**AOE** = Acute Otitis Externa

**OME** = Otitis Media with Effusion

**Severe signs** = Fever  $>39^{\circ}\text{C}$  or moderate-severe otalgia<sup>1</sup> or otalgia<sup>1</sup>  $\geq 48$  hours

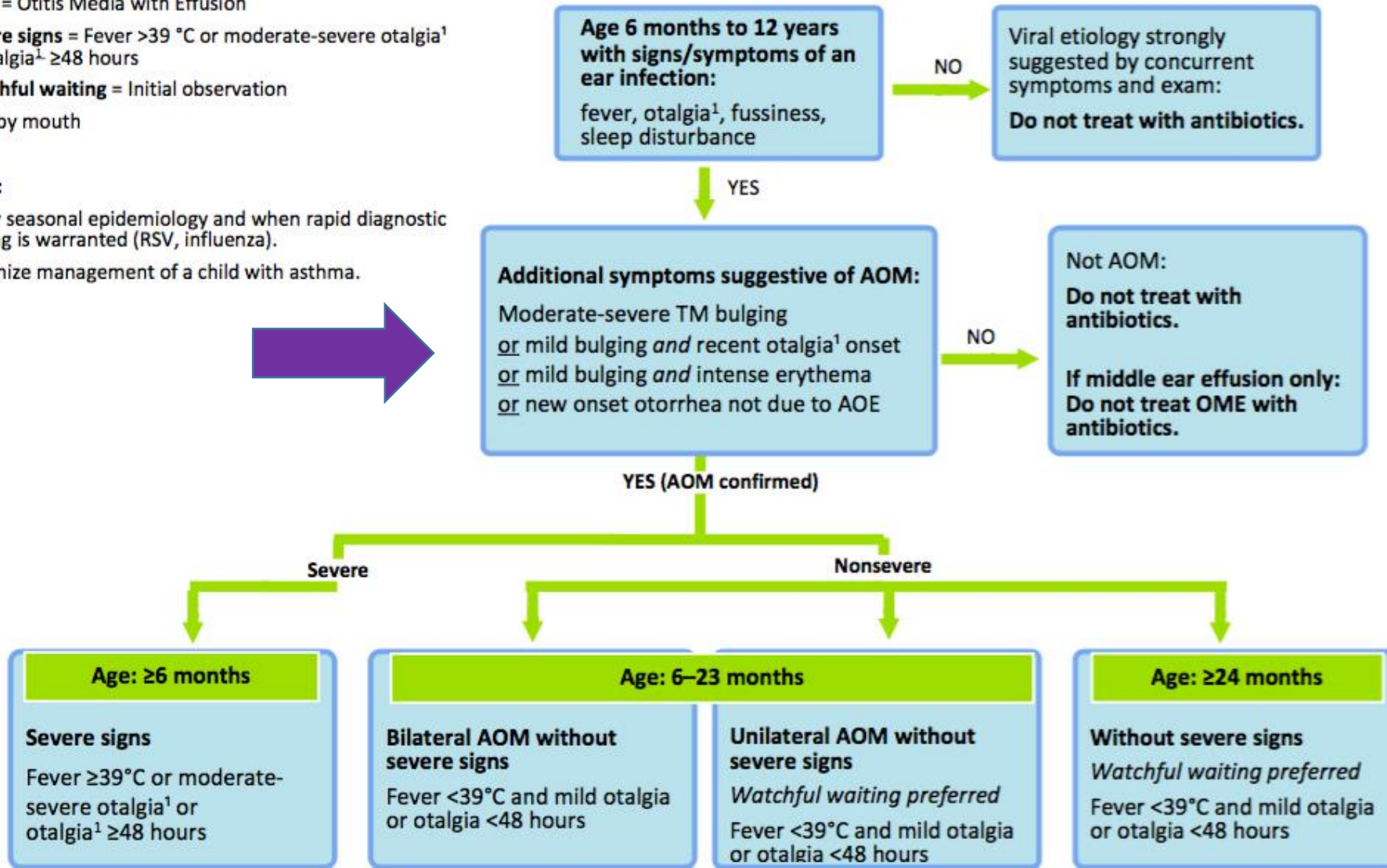
**Watchful waiting** = Initial observation

po = by mouth

**Note:**

Know seasonal epidemiology and when rapid diagnostic testing is warranted (RSV, influenza).

Optimize management of a child with asthma.



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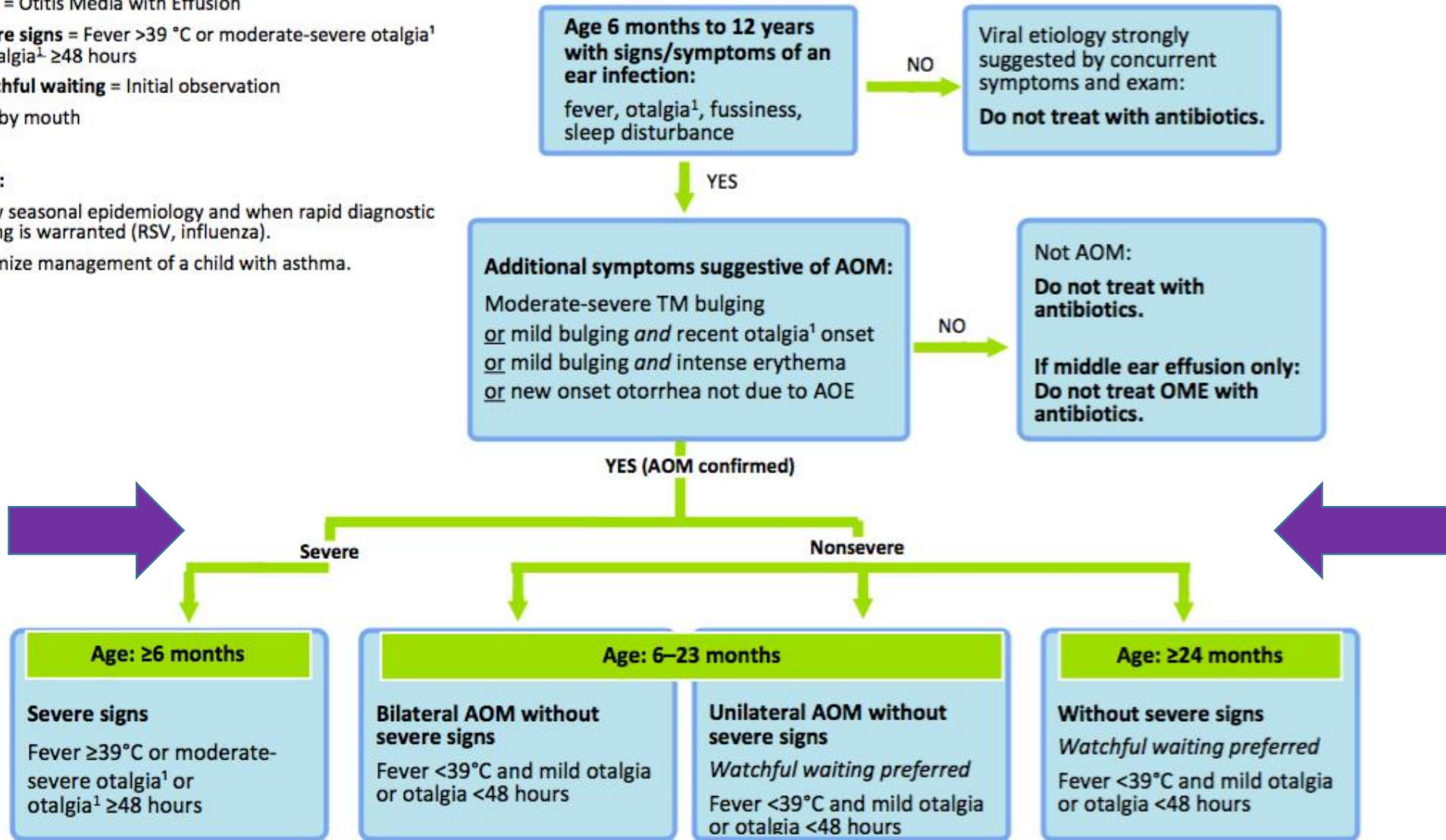
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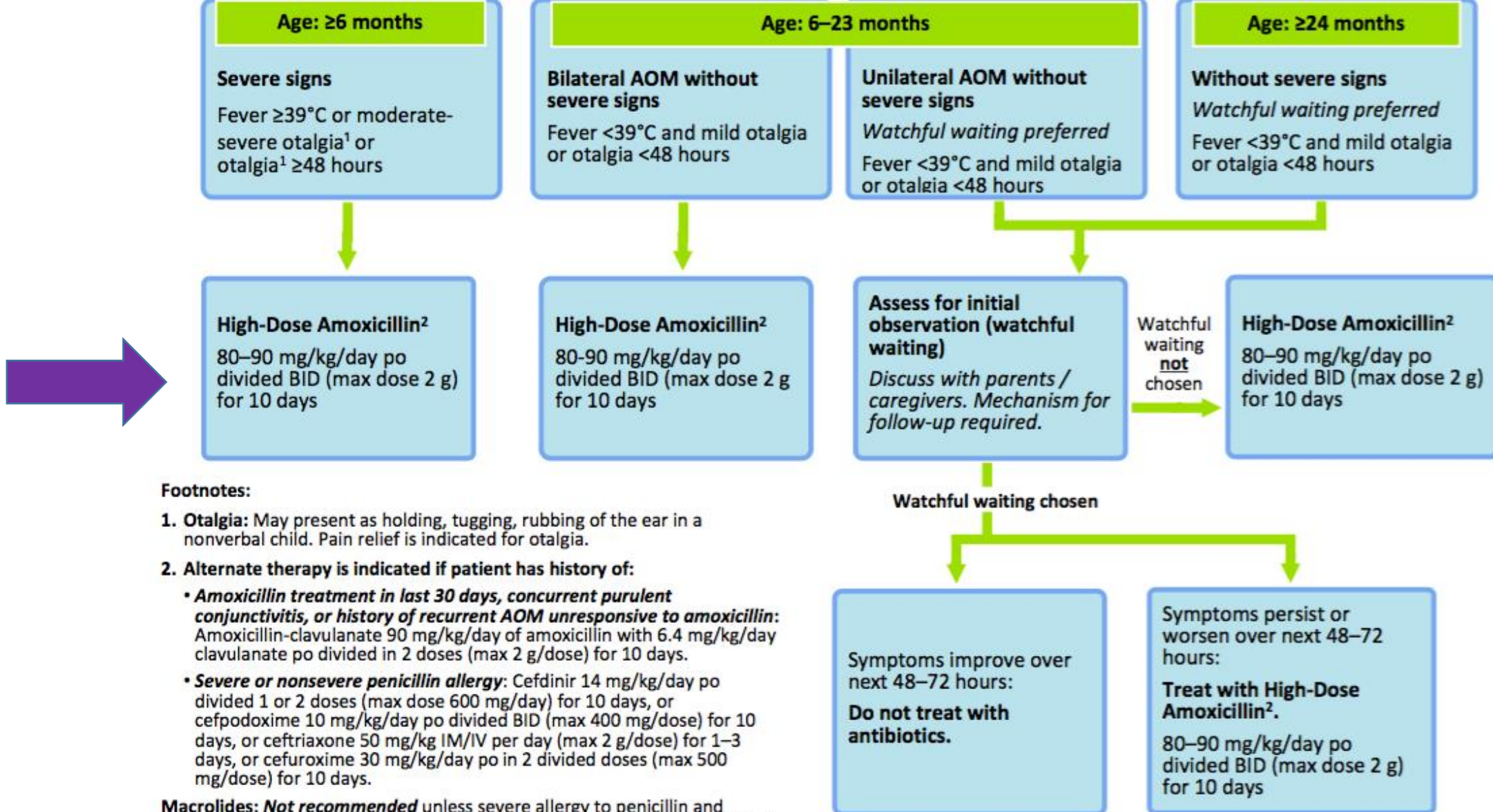
**po** = by mouth

**Note:**

Know seasonal epidemiology and when rapid diagnostic testing is warranted (RSV, influenza).

Optimize management of a child with asthma.





**Footnotes:**

- Otalgia:** May present as holding, tugging, rubbing of the ear in a nonverbal child. Pain relief is indicated for otalgia.
- Alternate therapy is indicated if patient has history of:**
  - Amoxicillin treatment in last 30 days, concurrent purulent conjunctivitis, or history of recurrent AOM unresponsive to amoxicillin:** Amoxicillin-clavulanate 90 mg/kg/day of amoxicillin with 6.4 mg/kg/day clavulanate po divided in 2 doses (max 2 g/dose) for 10 days.
  - Severe or nonsevere penicillin allergy:** Cefdinir 14 mg/kg/day po divided 1 or 2 doses (max dose 600 mg/day) for 10 days, or cefpodoxime 10 mg/kg/day po divided BID (max 400 mg/dose) for 10 days, or ceftriaxone 50 mg/kg IM/IV per day (max 2 g/dose) for 1-3 days, or cefuroxime 30 mg/kg/day po in 2 divided doses (max 500 mg/dose) for 10 days.

**Macrolides: Not recommended** unless severe allergy to penicillin and cephalosporins exist. Resistance is well known and treatment failures related to macrolide resistance have occurred.

**Reference:**

**AAP Clinical Practice Guideline:** The Diagnosis and Management of Acute Otitis Media *Pediatrics*. 2013;131(3):1451-1465



# Acute Otitis Media

## The Bacterial Bugs



- What's in the middle ear?
  - Viruses
  - Bacteria
    - Strep pneumoniae
    - Hemophilus influenzae, non-typable
    - Moraxella catarrhalis
  - A mix of both

**TABLE 5** Recommended Antibiotics for (Initial or Delayed) Treatment and for Patients Who Have Failed Initial Antibiotic Treatment

Initial Immediate or Delayed Antibiotic Treatment		Antibiotic Treatment After 48–72 h of Failure of Initial Antibiotic Treatment	
Recommended First-line Treatment	Alternative Treatment (if Penicillin Allergy)	Recommended First-line Treatment	Alternative Treatment
Amoxicillin (80–90 mg/kg per day in 2 divided doses)	Cefdinir (14 mg/kg per day in 1 or 2 doses)	Amoxicillin-clavulanate <sup>a</sup> (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate in 2 divided doses)	Ceftriaxone, 3 d Clindamycin (30–40 mg/kg per day in 3 divided doses), with or without third-generation cephalosporin Failure of second antibiotic
or	Cefuroxime (30 mg/kg per day in 2 divided doses)	or	
Amoxicillin-clavulanate <sup>a</sup> (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate [amoxicillin to clavulanate ratio, 14:1] in 2 divided doses)	Cefpodoxime (10 mg/kg per day in 2 divided doses)	Ceftriaxone (50 mg IM or IV for 3 d)	Clindamycin (30–40 mg/kg per day in 3 divided doses) plus third-generation cephalosporin Tympanocentesis <sup>b</sup> Consult specialist <sup>b</sup>
	Ceftriaxone (50 mg IM or IV per day for 1 or 3 d)		

IM, intramuscular; IV, intravenous.

<sup>a</sup> May be considered in patients who have received amoxicillin in the previous 30 d or who have the otitis-conjunctivitis syndrome.

<sup>b</sup> Perform tympanocentesis/drainage if skilled in the procedure, or seek a consultation from an otolaryngologist for tympanocentesis/drainage. If the tympanocentesis reveals multidrug-resistant bacteria, seek an infectious disease specialist consultation.

<sup>c</sup> Cefdinir, cefuroxime, cefpodoxime, and ceftriaxone are highly unlikely to be associated with cross-reactivity with penicillin allergy on the basis of their distinct chemical structures. See text for more information.



# Otalgia

## When To Think Harder:

If You Note...	=	Make Sure to Consider...
Deflated, wrinkly-appearing TM	=	Possible TM perforation
Ear canal with erythema, debris, or drainage Ear painful with pinna or helix tugging	=	Otitis Externa Infection
Abnormal appearance of canal, cannot visualize TM, child < 6yo	=	Foreign Body
Mastoid tenderness or erythema Ear appears pushed forward	=	Mastoiditis
White/yellow lumpy mass near TM	=	Cholesteatoma
Cochlear implant w/ AOM -OR- Toxic appearing child	=	High Risk Associated Infections (meningitis, subdural abscess)

# Otalgia

## Bottom Line

- Not all otalgia is AOM and not all AOM needs antibiotics
- The AAP has excellent guidelines on who should get antibiotics...
  - \*\*\*but ONLY IF YOU GET A GOOD LOOK AT THE TM!
- Parents can often be convinced to “Watch-and-Wait,” but you have to be confident with your plan and delivery!
- Most AOM will resolve regardless. However, give parents good return precautions and stay vigilant for scary complications.



# Respiratory Illnesses

## Clinical Presentation

Chief Complaint: 6 year old F with fever and tachypnea

HPI: -1 week of upper respiratory symptoms

-New fevers to 40C over last 2 days

-Faster, harder breathing today

-Decreasing PO intake; seems more tired

PMHx: Otherwise healthy child; fully immunized.

Exam: RR 40, HR 150, Temp 38.9C. Right base with fine crackles. Left base clear. No wheezing, no stridor.

***Do we need a chest x-ray?***

***Do we treat with antibiotics?***

# Respiratory Illnesses

## Differential Diagnosis

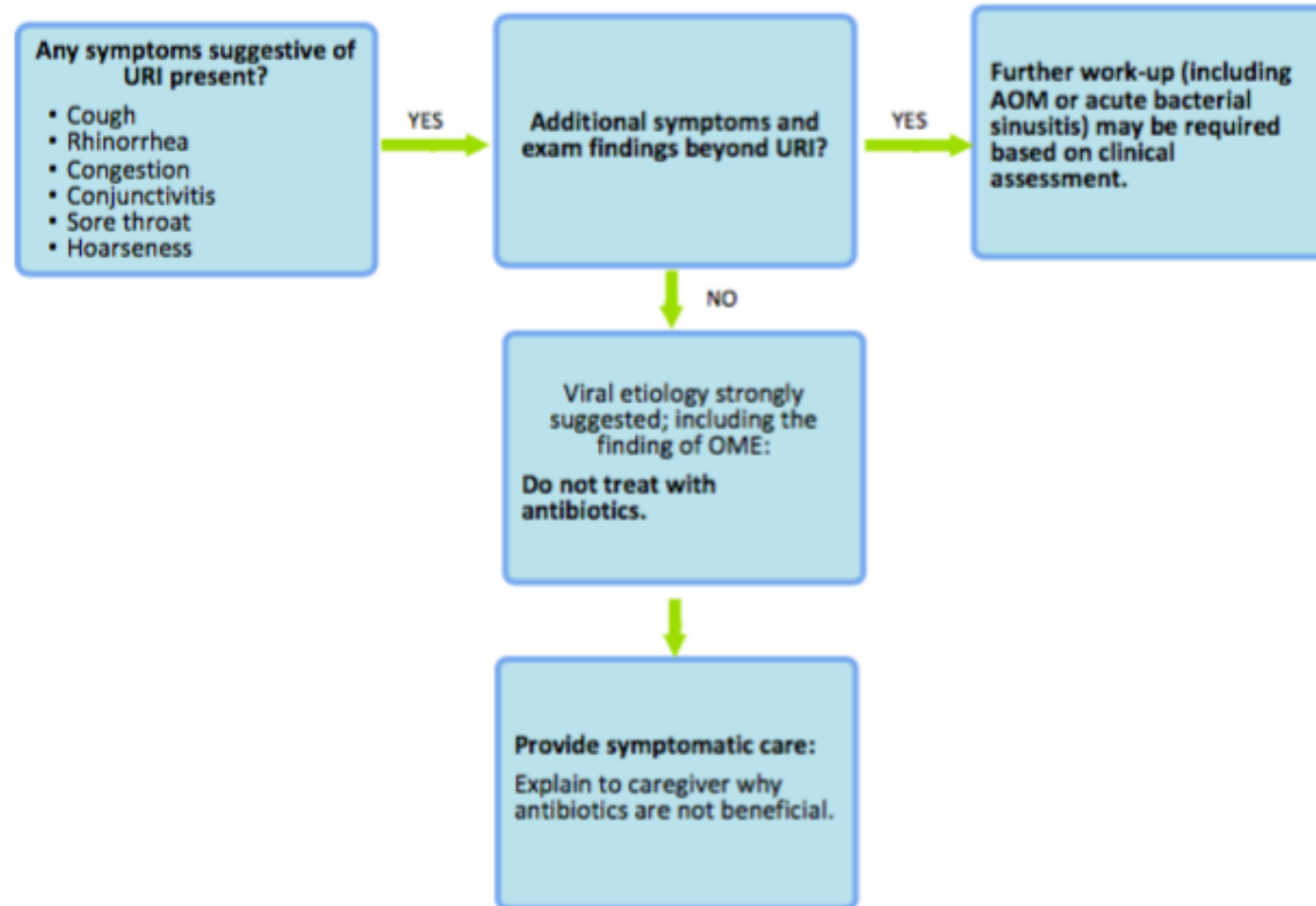
### Limited DDX for Children with Fever and Respiratory Symptoms

Viral Upper Respiratory Infection	Bronchiolitis
Viral Pneumonia	Bacterial (Lobar) Pneumonia
Viral Bronchitis	Atypical (Walking) Pneumonia
Viral Sinusitis	Bacterial Sinusitis
Croup	Bacterial Tracheitis
Asthma with Viral Trigger	Infected Foreign Body Aspiration

# Judicious Use of Antibiotics for Viral Upper Respiratory Infection

## Note:

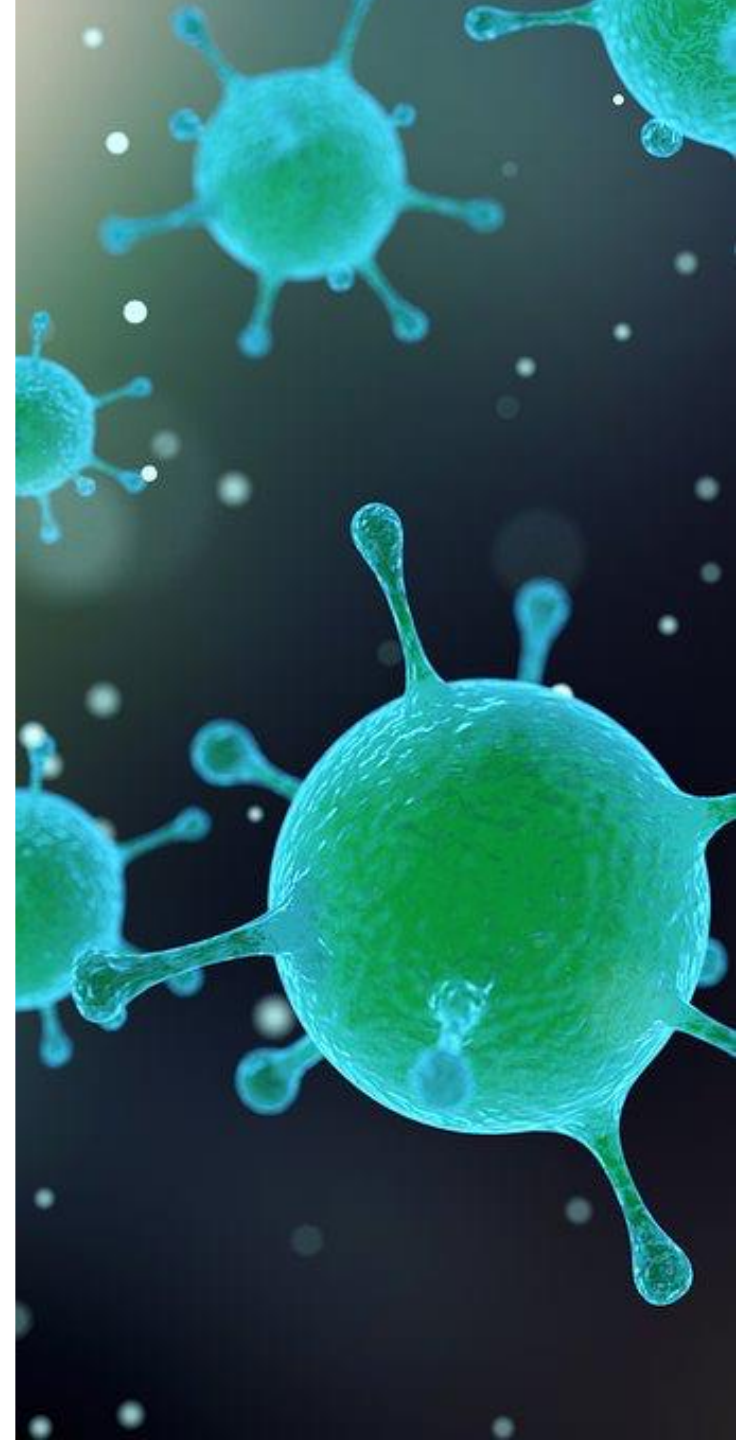
Know seasonal epidemiology and when rapid diagnostic testing is warranted (RSV, influenza).



# Viral URI

Good News and Bad News...

- Acknowledge their child is sick
- Provide reassurance
- Teach them something
- Review return precautions



# Viral URI

## The Treatment

- Congestion:
  - Humidifier in the room
  - Steamy bathroom
  - Warm shower
  - Nasal rinses
  - Bed positioning
- Cough Care:
  - Honey for 1-6yo
  - OTC cough meds for >6yo
    - Phenylephrine, guaifenesin, dextromethorphan
  - Cough drops for >10yo
- Aches & Pains:
  - Acetaminophen, NSAIDs





# Viral URI

What **NOT** to Use



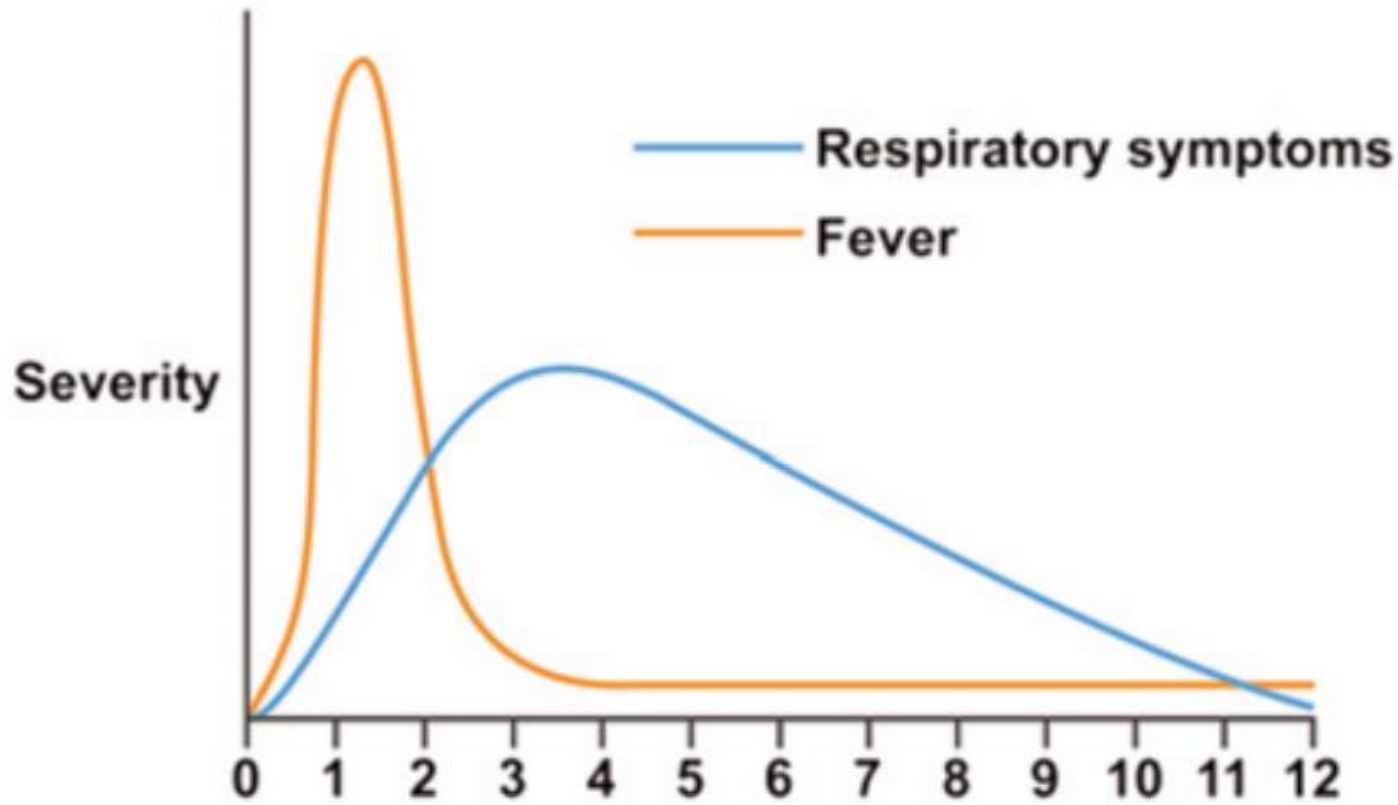
## Combination Medications:

Acetaminophen/Paracetamol  
AND Codeine

### **2015 FDA Warning & Restriction:**

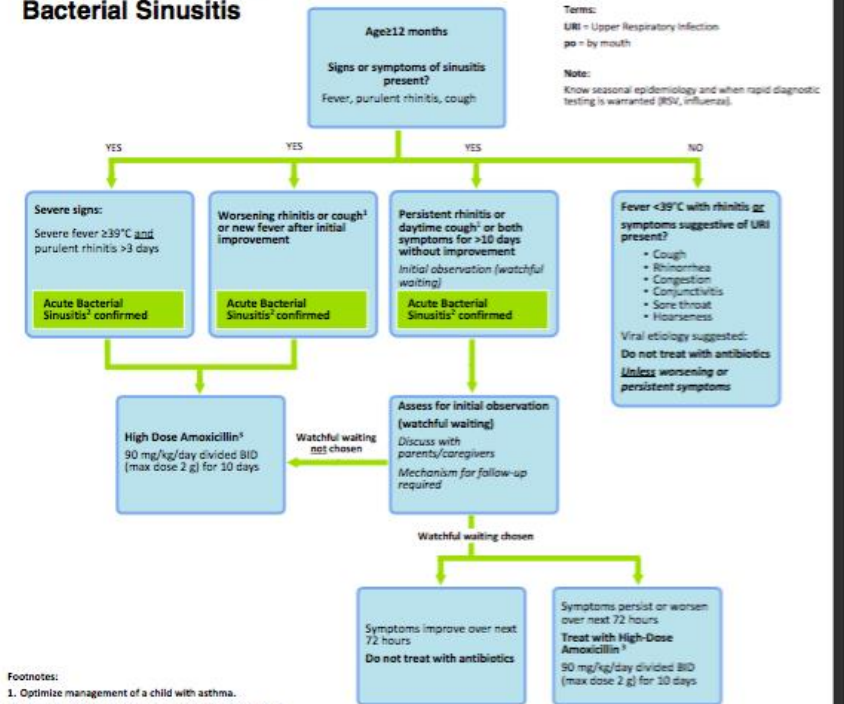
Do not use in children < 12 yo  
due to risks of  
respiratory depression, apnea, and death.

# URI vs Sinusitis



Typical Viral URI Timeline

## Judicious Use of Antibiotics for Acute Bacterial Sinusitis



### Footnotes:

- Optimize management of a child with asthma.
- Sinus imaging or CBC not recommended for diagnosis of acute bacterial sinusitis.
- Alternate therapy is indicated if patient has:
  - Moderate to severe illness, is younger than 2 years, attends child care, received amoxicillin treatment in last 30 days, or has concurrent purulent conjunctivitis: Amoxicillin-clavulanate 90–90 mg/kg/day of amoxicillin with 6.4 mg/kg/day clavulanate po divided in 2 doses (max 2 g/dose) for 10 days
  - Severe or nonsevere penicillin allergy: Cefdinir 14 mg/kg/day po divided BID (max dose 300 mg/dose) for 10 days or cefpodoxime 10 mg/kg/day po divided BID (max dose 400 mg/dose) for 10 days or ceftriaxone 50 mg/kg IM/IV (max 2 g/dose) for 3 days or cefuroxime 30 mg/kg/day po in 2 divided doses (max 500 mg/dose for suspension) for 10 days

### Reference:

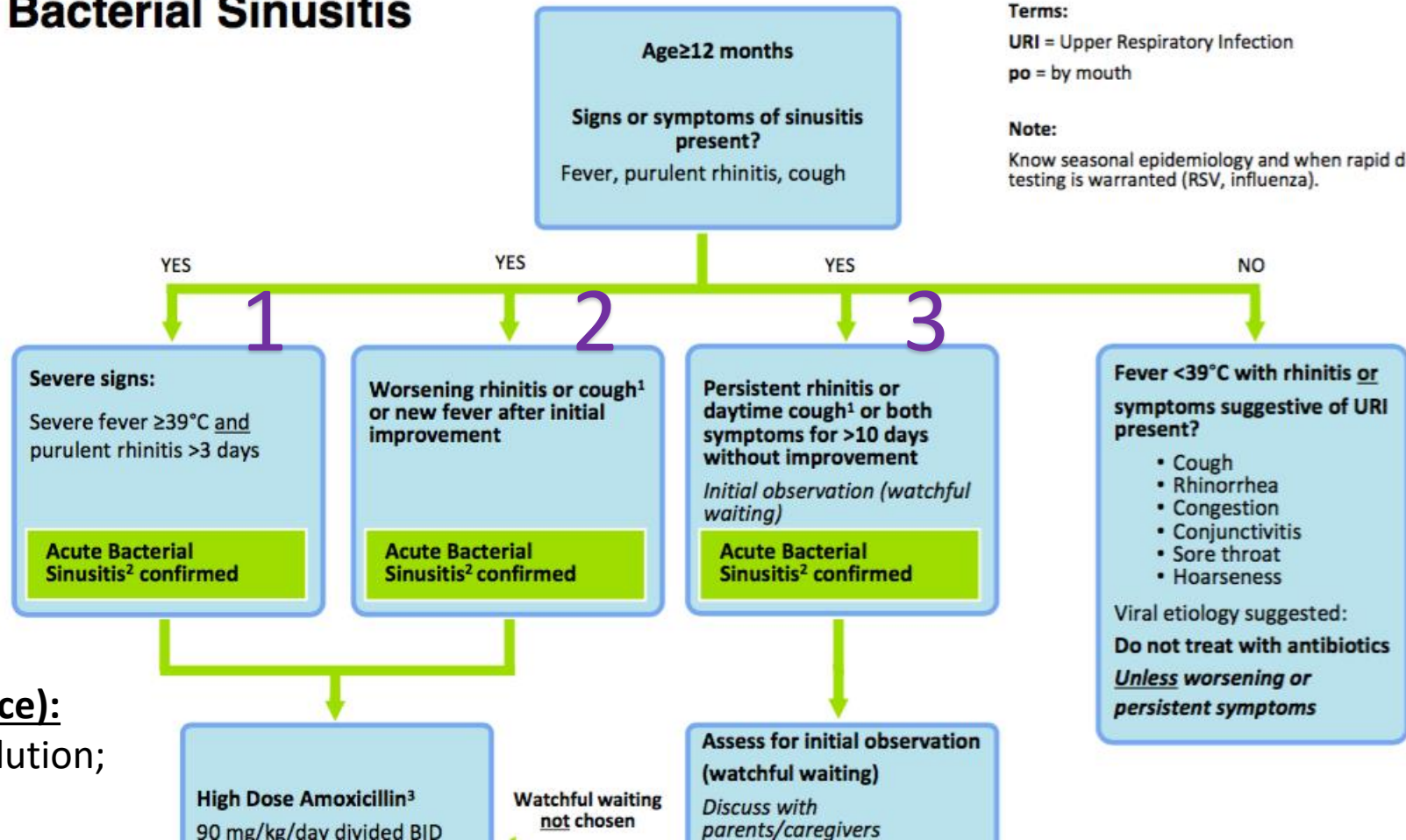
AAP Clinical Practice Guideline for the diagnosis and management of acute bacterial sinusitis in children aged 1 to 18 years. *Pediatrics*. 2013;132:e262.

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# Sinusitis

## Can We Treat It?

### Judicious Use of Antibiotics for Acute Bacterial Sinusitis



**Abx Duration (less evidence):**  
7 days past symptom resolution;  
minimum 10 days

# Pneumonia

## The Diagnosis

- Is there a consensus on how to diagnose pneumonia?
  - No.
- When to consider community acquired pneumonia (CAP):
  - Fever + cough + dyspnea + tachypnea + increased work of breathing
  - Hypoxemia on SpO2 check
  - Focal fine crackles on auscultation, particularly unilateral
  - Chest x-ray findings of focal consolidation



# Pneumonia

## The Community Bugs

- What pathogens are responsible for pneumonia?
  - Children < 5 years old
    - 80% virus!
    - RSV, influenza, human metapneumovirus, adenovirus, coronavirus, rhinovirus
  - School-aged children 2-10 years old
    - Viral: pathogens above
    - Bacterial: strep pneumo; severe: staph aureus
  - Older Children and Adolescents:
    - Consider Atypical Pneumonia
      - Pathogen: Mycoplasma
      - Course: slowly progressing illness with fever, malaise, sore throat, cough, bilateral
      - Symptoms can linger for weeks

# Pneumonia

## The Diagnostic Tests



- What can we consider for diagnostics?
  - Pulse ox in every child
  - Consider checking for influenza, as may change management
  - Consider checking chest x-ray if more severe or diagnosis in question
- What is NOT recommended routinely for diagnostics?
  - Routine CBC if candidate for outpatient management
  - Routine viral pathogen testing unless it will change management
  - Blood culture, unless toxic or septic appearing
  - Inflammatory markers will not differentiate viral from bacterial
  - Routine chest x-ray if clinically consistent with non-severe presentation of CAP
  - Follow-up chest x-rays if clinically improving

# Pneumonia

## The Treatment

- Who should be hospitalized?
  - Moderate to Severe CAP, including respiratory distress or sustained SpO<sub>2</sub> <90%
  - Children with suspicion for more virulent pathogens such as Staph Aureus
  - High consideration for infants 3-6mo
  - Children with risk factors for non-compliance in home environment
- Which antibiotic?
  - Outpatient
    - Most preschool children w/ CAP: **No antibiotic** (viral!)
    - Immunized infants and preschool children with mild-mod CAP: **Amoxicillin x 10 days**
    - Older children and adolescents with mild-mod CAP: **Amoxicillin x 10 days**
    - Older children and adolescents with atypical pneumonia: **Azithromycin x 5 days**
  - Inpatient/Hospitalized
    - Most immunized infants or children with CAP: **IV Ampicillin or Penicillin**
    - Unimmunized or severely ill infants or children with CAP: **IV/IM Ceftriaxone +/- Vancomycin**

# Can We Shorten The Course?

Two recent 2022 systematic reviews on short vs long abx tx:

## 1) Qinyuan Li, et al: *JAMA Pediatrics*

- Included 9 RCTs = 11,143 kids aged 2mo-5yrs w/ non-severe CAP
- Treatment failure similar (12.8% vs 12.6%) for short vs long abx course
- 3 day non-inferior to 5 day; 5 day non-inferior to 10 day
- Lower GI symptom rate; lower “absentee caregiverism”

## 2) IR Marques, et al: *Eur J Pediatr*

- Included 3 RCTS = 789 kids aged 6mo- 10 yrs
- No difference in cure rate between 5 vs 10 day course of amoxicillin

### **BOTTOM LINE:**

*Consider shorter course of abx therapy may be as therapeutic but ensure close follow-up!*





# Respiratory Illnesses

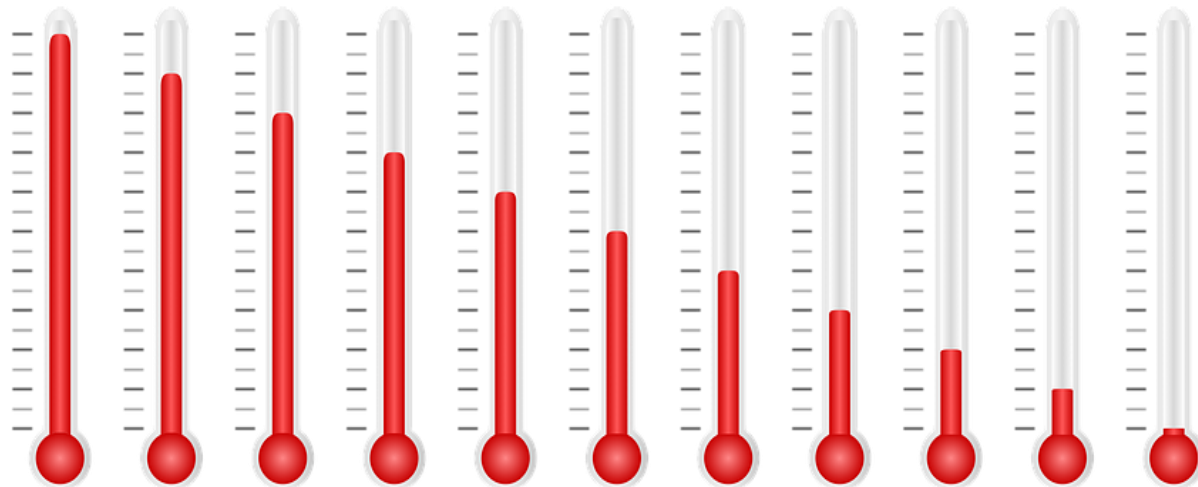
## When To Think Harder:

If You Note...	=	Make Sure to Consider...
Child < 2yo w/ rhonchi, wheezing, congestion, increased work of breathing	=	RSV Bronchiolitis
Child < 5 yo w/ wheezing/stridor, recurrent infections/cough without expected improvement	=	Foreign Body Aspiration
Infant < 4 mo old w/ respiratory symptoms +/- hx of conjunctivitis	=	Chlamydiae pneumonia
Dysphagia, developmental delay	=	Aspiration pneumonia (anaerobic coverage)
Toxic appearing child	=	Assessment and abx coverage for staph species, influenza
Adolescent, chronic cough, testicular mass, abnormal CXR	=	Testicular cancer with Pulmonary Metastasis
Chronic cough, recent travel, abnormal CXR	=	Tuberculosis

# Getting 'Em Home

Discharge goals for most minor illnesses:

- Improvement in fever
- Improvement in associated tachycardia
- Demonstrate ability to take some PO
- Can tolerate medications
- Understand next steps and return precautions



# Medication Management:

What to do if they refuse?



**Tips for getting kids to  
take something they  
don't want...**





## Tips for getting kids to take something they don't want:

- Chocolate/Nutella
- Rewards System



- Give the patient as much control as possible, ask if they want to “help”
- Infants: blow in their face, follow immediately with pacifier or bottle to get them to swallow

- **Watch out** for mixing with a whole bottle or cup!





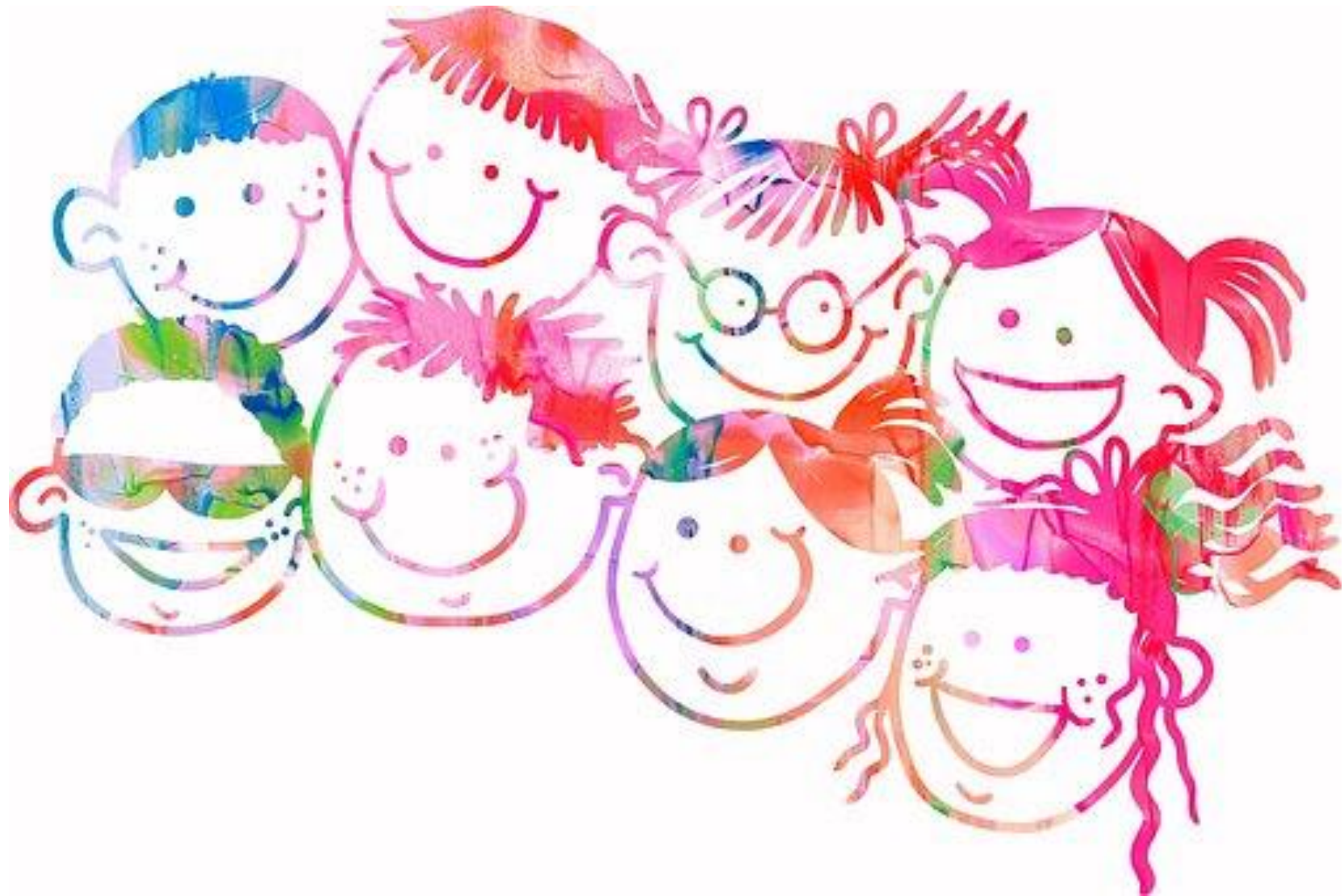
# Tips for getting kids to take something they don't want:







Go Forth and Give Popsicles...





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